AMPEX

FIELD ENGINEERING BULLETIN

VOLUME II PART	4
REFERENCE NUMBER	40390
SHEET NUMBER	1.1 - 1
MODEL NUMBER	FR1900
DATE OF ISSUE	1-16-70
Distribution:	39-1, 39-2, 43-3

TITLE ADJUSTMENTS FOR THE NEW SERVO

CCP MASTER & BULK

I APPLICABILITY:

All FR1900's using the new servo consisting of:

1240452	Reel Servo	(Sch. 1240454)
1241344	Capstan Servo	(Sch. 1241345)
1241500	Heat Sink	(Sch. 1241574)

II PURPOSE:

To provide an alignment procedure for the new servo system used in the current FR1900 system.

III DISCUSSION:

This is basically a copy of the interim alignment procedure currently being added to all new FR1900 Manuals with additions and changes to make adjustments easier.

NOTE

Brake armature plates should now be adjusted so that light can be seen between it and the lining all around (i.e., as close as possible without touching). This procedure replaces the measurement of .020 ±.005 described in Servo Adjustment Procedures.

IV PARTS AND SPECIAL TOOLS REQUIRED:

The test equipment and tools listed in the manual will suffice for the adjustments.

ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE:

A. CAPSTAN SERVO ALIGNMENT

The procedures for capstan servo alignment are divided into three parts: capstan static torque check, capstan servo compensation and brake amplifier card alignment, and final adjustments during capstan run. Before starting the alignment procedures, check the power supply regulators during standby mode. Refer to the applicable FR1900 Operation and Maintenance Manual for power supply regulators adjustments.

B. CAPSTAN STATIC TORQUE CHECK

The procedure for adjusting the capstan static torque is as follows:

1. Rotate R15, on the heat sink assembly, fully counterclockwise. Then connect the vtvm across R13, on the heat sink assembly with the negative probe to the ground side. See Figure 1 for location of R15 and R13 on the heat sink.

2. Place the system in standby mode.

3. Rotate R15, on the heat sink, in the clockwise direction until the vtvm reading across R13 reads 4.8 vdc (500 ma holding current).

C. CAPSTAN SERVO COMPENSATION AND BRAKE AMPLIFIER CARD ALIGNMENT

The procedure for aligning the capstan servo compensation and brake amplifier card is as follows:

1. Remove power from the system.

2. Rotate R21 on the capstan servo compensation and brake amplifier card, fully counterclockwise, then back off approximately seven turns clockwise. See Figure 2 for location of R21.

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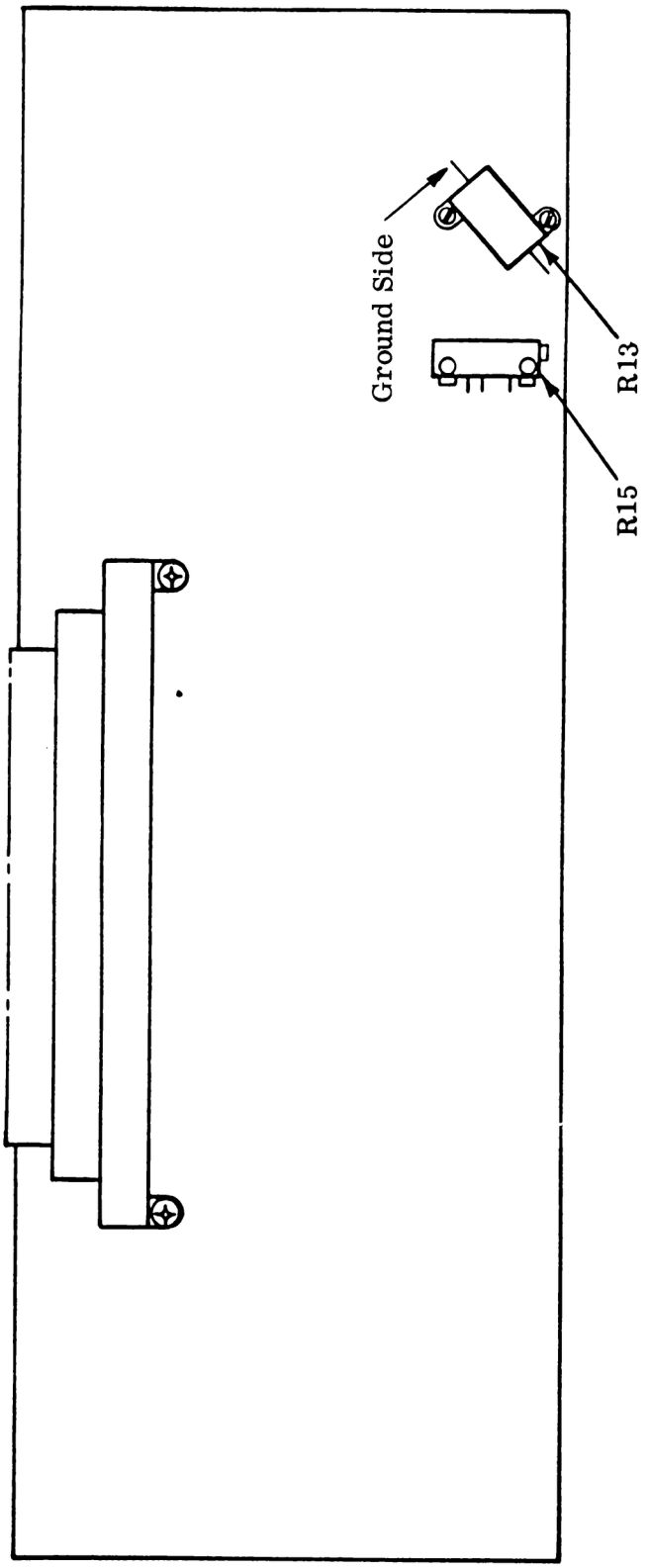

Figure 1. Location of R15 and R13 on Heat Sink Assembly

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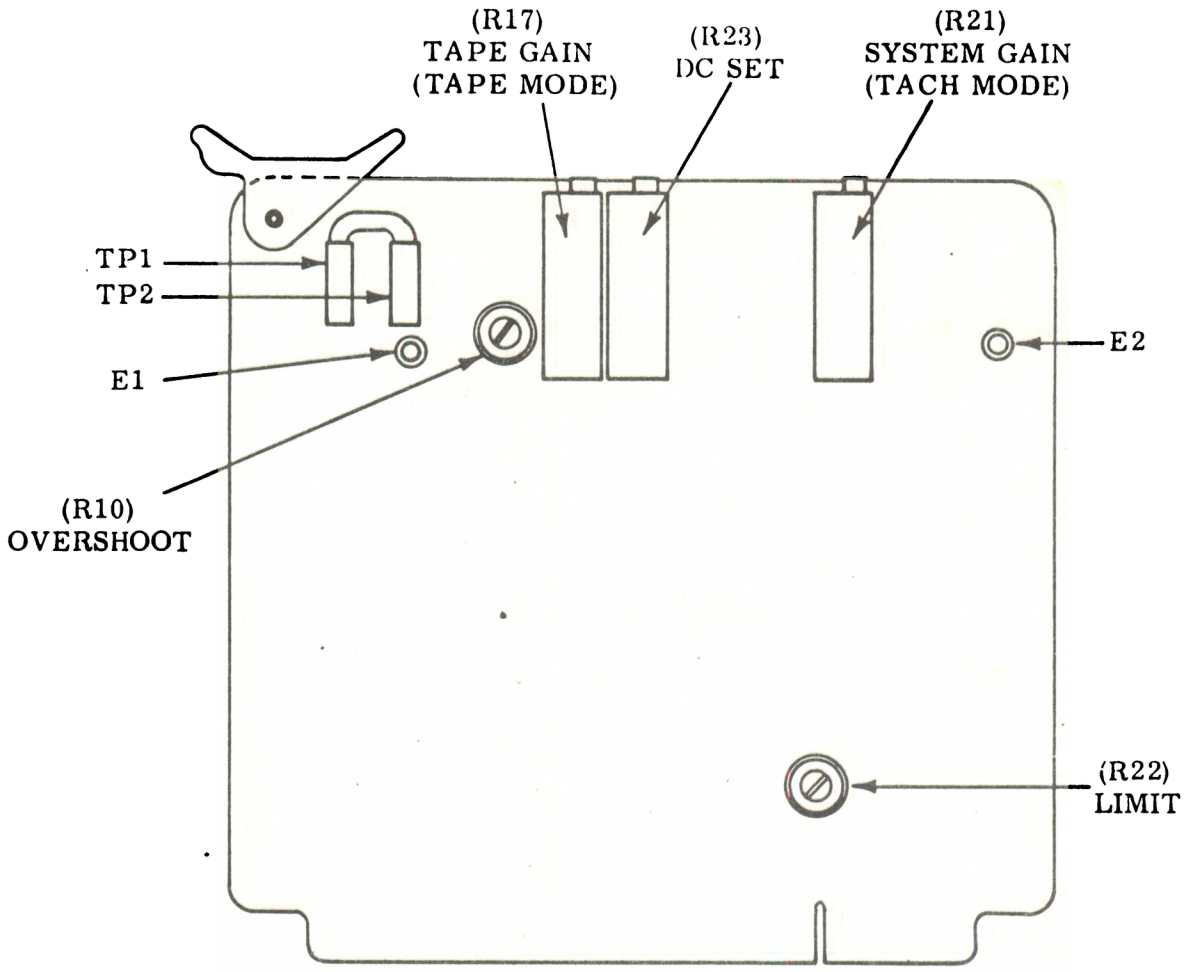

CONTROL	FUNCTION
R10	Controls the length of time that rotation of the capstan is halted when switching from a high speed to a slow speed.
R17	Used to set system gain during tape mode only. Set for best time base error (TBE).
R23	Used to set dc voltage on test point E1 during final adjustment of capstan run.
R21	Used to set system gain during tach mode only. Set for best TBE.
R22	Sets maximum braking current.

Figure 2. Capstan Servo Compensation and Brake Amplifier Card Adjustment Points

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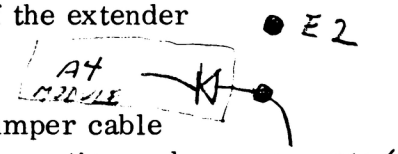
TITLE ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

C. CAPSTAN SERVO COMPENSATION AND BRAKE AMPLIFIER CARD ALIGNMENT (CONT.)

3. Insert the capstan servo compensation and brake amplifier card into the extender card and plug the extender card into J130 of the control bay. Ensure that the jumper is in place between TP1 and TP2 on the capstan servo compensation and brake amplifier card.

4. Connect the positive lead of the vtvm to pin W of the extender board, and the negative lead to the chassis.



5. Put the system in standby mode and connect a jumper cable between test point E2 on the capstan servo compensation and brake amplifier card, and pin D of the extender card. Rotate R22, on the capstan servo compensation and brake amplifier card, clockwise until the vtvm reads 1.2 - 1.3 vdc. Disconnect the jumper cable from pin D.

C11 + SIDE

+2.0V.D.C. ± .2V

6. Using the procedure described in Final Adjustments During Capstan Run, step 6 through 8, look at the time base error while R22 is adjusted. The machine must be moving tape at 120 ips. Adjust R22 for the minimum time base error in this voltage range. If the voltage is decreased the time base error will increase sharply. R22 should be set just above this point. Check the voltage measured in step 5. The measurement must be within the stated voltage range.

7. Put the system in the standby mode and remove the oscilloscope probe. Also remove the jumper cable from pin D and connect it to the chassis.

8. Rotate R23, on the capstan servo compensation and brake amplifier card, until the vtvm reads 0.7 (±0.1) vdc. See Figure 2 for location of R23.

9. Remove power from the system and remove the test equipment. The extender card and the capstan servo compensation and brake amplifier card shall remain intact.

ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

D. FINAL ADJUSTMENTS DURING CAPSTAN RUN

The final adjustments on the capstan servo are as follows:

1. Set R10, overshoot timing, full clockwise.

2. Apply power to the system and place the TAPE SPEED selector switch on the control bay front panel in the 3-3/4 ips position. Place recorder/reproducer in a forward mode of operation.

3. If the TACH lamp does not light steadily, rotate R21 on the capstan servo compensation and brake amplifier card until the lamp does light steadily. If the TACH lamp illuminates continuously, after tape movement has begun, adjustment of R21 is not necessary.

4. Connect the vtvm positive lead to test point E1 on the capstan servo compensation and brake amplifier card, and the negative lead to the chassis. See Figure 3 for location of E1.

5. Rotate R23 on the capstan servo compensation and brake amplifier card for 0.0 (±0.5) vdc reading on the vtvm.

CAUTION

THE RIGHT-HAND LEAD OF L3 IS NOT USED FOR A TEST POINT BECAUSE OF ITS PROXIMITY TO OTHER ELECTRONICS CIRCUITS. AN INADVERTENT SHORT BY THE SCOPE PROBE, WHILE POWER IS ON, WOULD CAUSE SERIOUS DAMAGE TO THE PHASE COMPARATOR CIRCUITRY.

TITLE ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

6. Carefully connect the oscilloscope probe to the LEFT-hand lead of L3, which is located at the top center of the phase comparator card. See Figure 3 for L3 location.

7. Set the TAPE SPEED selector switch (S18) to 120 ips.

8. Set the oscilloscope sweep speed to 2 μsec/cm. Synchronize on the leading edge of the positive going signal (+ sync). Display a single waveform on the screen similar to Figure 4. The trailing edge contains an error signal which represents servo action and, in turn, time base error.

9. Rotate R21 clockwise, lowering the gain until the TACH SYNC light goes out. At this time, the signal will disappear from the scope and the transport will be running overspeed.

10. Slowly turn R21 counterclockwise (increasing gain) until synchronism is achieved and the TACH SYNC light remains on.

11. Continue to turn R21 slowly counterclockwise until minimum time base error is observed at the trailing edge of the scope pattern. Expand the scope sweep to get a clearer picture of the error signal, if necessary. Adjustment of R21 in either direction from this point will increase time base error.

12. Set the TAPE SPEED selector switch to 1-7/8 ips. Adjust R21 for least timebase error. Set TAPE SPEED selector switch to 120 ips. Recheck timebase error.

13. For tape mode operation (signal off tape), rotate R17 on the capstan servo compensation and brake amplifier card for best TBE display on the oscilloscope screen at low and high speeds. See Figure 2 for location of R17.

14. Repeat steps 4 and 5.

15. Remove power from the system and remove the test equipment.

ADJUSTMENTS FOR THE NEW SERVO

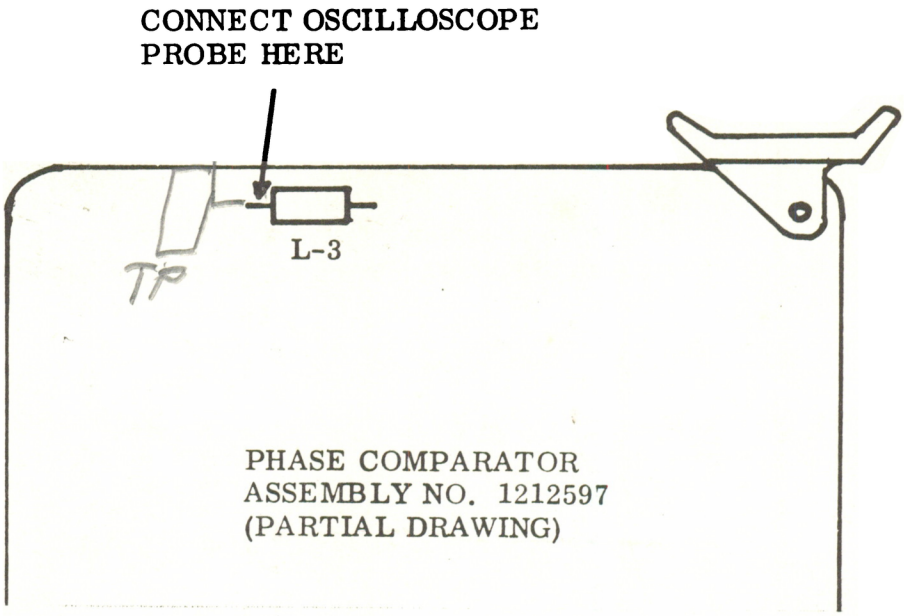


FIGURE 3. L3 TEST POINT

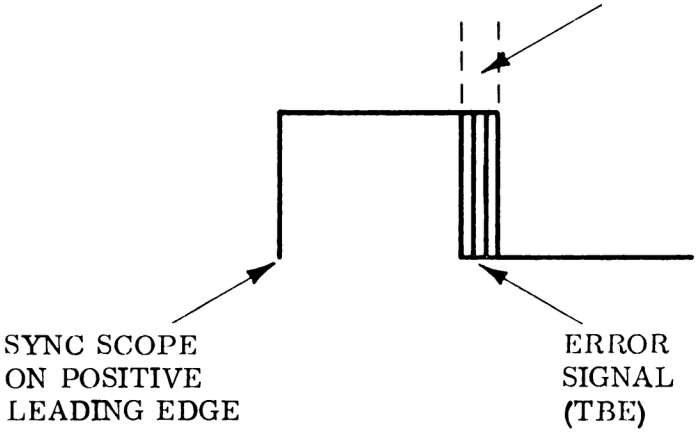


FIGURE 4. TYPICAL TIME BASE ERROR (TBE)

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TITLE ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

E. REEL SERVO ALIGNMENT

NOTE

Before commencing the following procedures, perform the power supply regulator adjustments.

1. Turn system power off.
2. Remove the tape from the transport.
3. Connect one lead of a vtvm to J1-J2 jumper of the upper reel servo card, located at J123 within the control bay, and the other lead to chassis ground.
4. Turn the system power switch on, set the vtvm polarity switch to read on-scale, and note the meter reading.
5. Completely cover the upper reel servo photo sensor by sliding an opaque card into the slot between the plenums and the photosensor cover. Reverse the vtvm polarity switch and note the meter reading.
6. The vtvm readings of steps 4 and 5 should be equal in magnitude to within ±5% and opposite in polarity. If these readings do not fall within the stated tolerances, adjust R1 of the photosensor for the correct reading. Adjustment of R1 is made through the access hole on the outside edge of the photosensor cover.
7. Remove power from the system, and disconnect the vtvm lead from the servo card.
8. Remove the upper reel servo card from J123, in the system control bay. Insert it into the extender card and plug the extender card into J123. Connect the vtvm lead to pin P of the extender card.
9. Rotate R26 full counterclockwise, and R6 and R21 fully clockwise. See Figure 5.
10. Connect a clip lead from chassis ground to the jumper which connects J3 and J4.

ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

E. REEL SERVO ALIGNMENT (CONT.)

11. Turn system power on.

12. Adjust R28 for 0.9 (±0.1) volt.

13. Turn system power off.

14. Disconnect the clip lead.

15. Restore system power.

16. Completely cover the upper reel photosensor using an opaque material.

17. Rotate the capstan in the appropriate direction to make a voltage appear at pin P.

18. Adjust R26 clockwise for a voltmeter indication of 3.5 volts. This adjustment sets the maximum brake current.

14 TURNS 19. Turn R21 to the midrange position and remove system power.

20. Repeat steps 3 through 19 for the lower reel servo card J124, covering the lower reel photosensor in steps 5 and 16.

NOTE

The next three steps check and adjust reel servo gain. Excessive reel servo gain can cause reel servo instabilities such as brake chatter or tape flutter in the plenum chamber, particularly on the reel with minimum tape. Insufficient reel servo gain causes poor stopping of full reels during fast modes of operation. A reel servo gain setting between these two extremes is desirable.

21. With a full reel of tape on the upper turntable, run the transport in both directions at 3-3/4 ips. Check for instability and if necessary reduce gain by turning R21 counterclockwise.

TITLE ADJUSTMENTS FOR THE NEW SERVO

V PROCEDURE (CONT.):

E. REEL SERVO ALIGNMENT (CONT.)

22. Turn the speed selector to 1-7/8 ips and operate the machine in the fast forward mode. When it is up to maximum speed, press the REVERSE drive button. If a tape loop is thrown beyond the edge of the upper plenum chamber, increase the upper reel servo gain by turnong R21 clockwise.

23. With a full reel of tape on the lower turntable, repeat steps 21 and 22, substituting fast reverse and 1-7/8 ips forward drive in step 22.

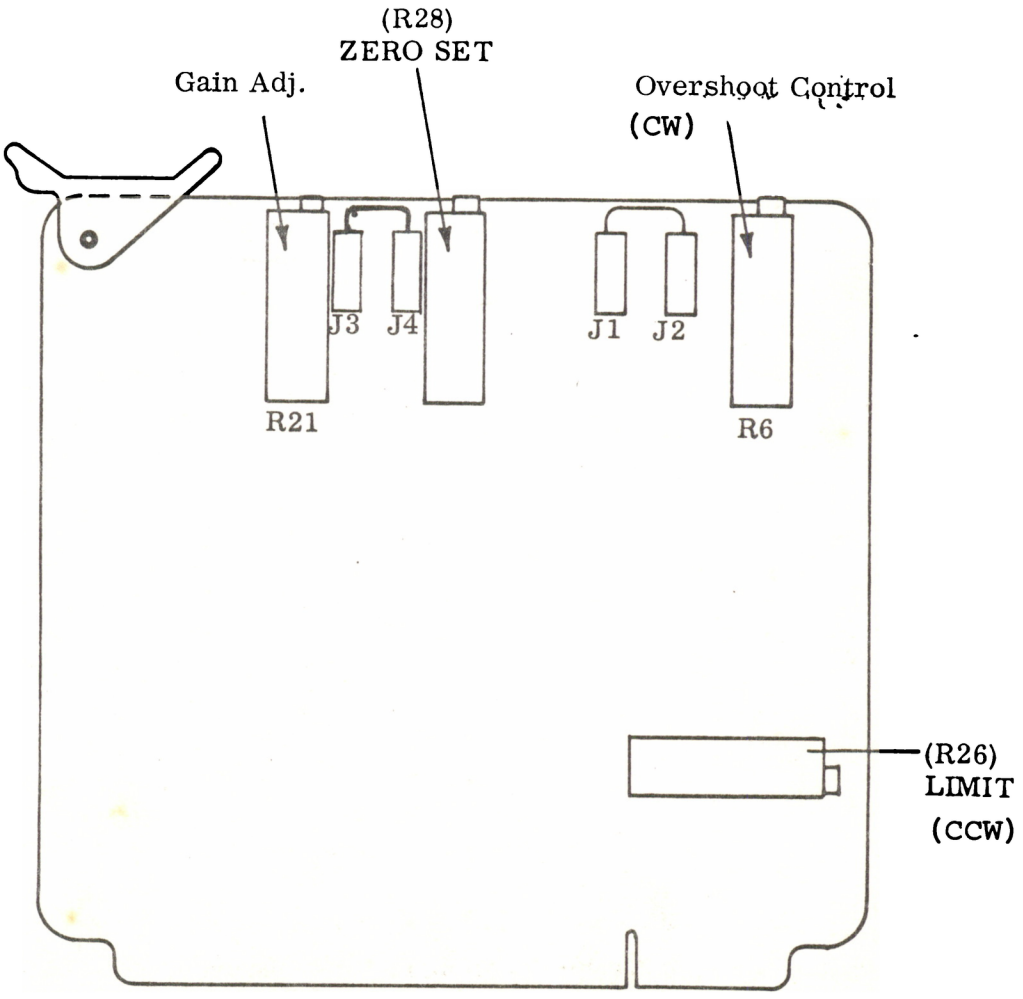

Figure 5. Upper and Lower Reel Servo Card Adjustment Points

ADJUSTMENTS FOR THE NEW SERVO

VI INSTRUCTION MANUAL CORRECTIONS:

Replace the manual adjustment procedure with this Field Engineering Bulletin.

VII ACTION TAKEN BY FACTORY:

Engineering Change Request initiated on 1-5-70.

Instrumentation Division/Technical Support
Wayne Hitchcock/jb